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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/540,896

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Renato Bugge

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EXAMINER

LANGMAN, JONATHAN C

ART UNIT

PAPER NUMBER

1784

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/540,896	Applicant(s) BUGGE ET AL.	
	Examiner JONATHAN C. LANGMAN	Art Unit 1784	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 May 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) 1-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 24-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>4/1/2010</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 24 and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mishurnyi et al. (Multicomponent Sb-Based solid solutions grown from Sb-Rich liquid phases") in view of Wu et al. ("Sulphur Passivation of the InGaAsSb/GaSb Photodiodes").

Mishurnyi et al. teach a system comprising an AlGaInAsSb quaternary semiconductor material (abstract) with a composition of $\text{Al}_x\text{Ga}_{1-x-z}\text{In}_z\text{As}_y\text{Sb}_{1-y}$ (page 38 second paragraph), wherein x, y, and z fall within the applicants instantly claimed ranges. Mishurnyi teaches using the layer in lasers. Mishurnyi does not teach that the system comprises a wet etchant for wet acid etching a portion of the semiconductor material. Wu et al. teach an electronic semiconductor device comprising layers of InGaAsSb, for use in LED's, lasers, Photodiodes, etc. (pg 1303, col. 1, lines 1-4). To form these structures Wu et al. teaches etching the layers with a wet etching solution comprising, HF:Tartaric acid:H₂O₂:H₂O in amounts of (5ml:1.2g:10ml:160ml) (pg 1303, col. 1). Hydrofluoric acid, Tartaric acid, Hydrogen peroxide, and Water have densities of 1.15, 1.886, 1.4465, and 1.00 gram/ml, respectively. Respective weights are therefore: (5ml x 1.15g/ml=5.75g of HF), (1.2g of Tartaric acid), (1.4465g/ml x

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10ml=14.465g of H_2O_2), and (1 g/ml x 160 ml=160g of H_2O), with a total weight of 181.415 g. Respective weight percents are: 3.17 wt % for HF, 0.66 wt % for Tartaric Acid, 7.97 wt % for H_2O_2 , and the balance is water.

These weight percents fall within the ranges of claims 32-34, wherein Tartaric acid is an organic acid and H_2O_2 is an oxidizing agent.

It would have been obvious to a person having ordinary skill in the art at the time the present invention was made to use this etching system taught by Wu et al as an etchant for etching the semiconductor material of Mishurnyi, as it has been shown to be a known etchant in the art of forming desired InGaAsSb, laser structures. Although Wu et al. may not specifically teach that the etchant is used on AlGaInAsSb structures, a routineer in the art would have appreciated the work since Wu et al. teaches etching InGaAsSb, and would have applied this known etching composition to Mishurnyi in order to obtain a desired structure. Wu et al. has shown that these etching techniques for compound semiconductors of the AlGaIn series are beneficial and a known technique in the art.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mishurnyi and Wu, as applied to claims 24 and 32-34 above, further in view of Garbuzov et al. ("2.3-2.7 micron Room temperature CW operation of InGaAsSb-AlGaAsSb Broad Waveguide SCH-QW Diode Lasers").

Wu teach an etchant for semiconductor materials. Mishurnyi teach an AlGaInAsSb layer as described above. Mishurnyi do not specifically teach doping the

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layer. However it is known in the art and taught by Garbuzov et al., that to achieve desired electrical properties doping GaAlIn series layers with Te in order to achieve n-type layers, and to use Be to achieve p-type layers. It would have been obvious to a person having ordinary skill in the art at the time the present invention was made to dope the layers as taught by Mishurnyi with known dopants such as Te for n-type doping and Be for p-type doping, in order to obtain desired electrical properties as is known in the art.

Claims 26-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mishurnyi, Wu and Garbuzov as applied to claim 25 above, further in view of Deryagin et al., "High Quality AlGaAsSb, AlGaAsSb and InGaAsSb epitaxial layers Grown by LPVE from Sb-rich melts".

Mishurnyi et al. do not disclose the type of lasers these layers may be used in. Deryagin et al. teach that AlGaAsSb layers may be used in lasers, photodiodes, and Led's, (introduction). Therefore, it would have been obvious to a person having ordinary skill in the art at the time the present invention was made to use the semiconductor device and etching steps of Mishurnyi, Wu, and Garbuzov to form and use the semiconductor material as a layer in a LED, Photodiode, sensor or laser, as is known in the art.

Regarding claims 29-30, the semiconducting structure, is more than capable of being used as a part of a VCSEL or a PCDFL as is known in the art.

Response to Arguments

Applicant's arguments with respect to claims 24-34 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JONATHAN C. LANGMAN whose telephone number is (571)272-4811. The examiner can normally be reached on Mon-Thurs 8:00 am - 6:30 pm EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on 571-272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JCL

/Jennifer C. McNeil/
Supervisory Patent Examiner, Art Unit 1784